

GUIDELINES FOR PEDIATRIC TRAUMA CENTERS

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February 1994

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1994

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EMERGENCY MEDICAL SERVICES FOR CHILDREN

California EMS Authority

Guidelines For Pediatric Trauma Centers



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Introduction

Regional referral centers with specialized personnel, facilities, and services for critically ill and injured children are an essential component of EMS for Children (EMSC) systems. Children may have rapidly progressive illnesses and injuries which often differ from adults in etiology, pathophysiology, and management. Specialized pediatric diagnostic techniques, physiologic monitoring, life support systems, medications, and treatments are often required.

There have been significant recent advances in pediatric critical care medicine and pediatric trauma care. Specialized training programs and certification in pediatric critical care have been established for physicians and other health professionals. As a result, highly specialized centers for the care of critically ill and injured children have developed throughout California and the United States. A persuasive body of data now appears to indicate that pediatric morbidity and mortality can be reduced when critically ill and injured children, particularly children requiring intensive care, are rapidly transported to appropriate centers with pediatric critical care and pediatric trauma services.

A number of local EMS agencies in California have established standards for specialized pediatric critical care and pediatric trauma centers. However, there are no statewide guidelines available that can be used as a basis for standardization of center resources and for regional referral center designation. This document provides two sets of guidelines. (1) Guidelines for Pediatric Critical Care Centers (PCCC) and (2) Guidelines for Pediatric Trauma Centers (PTC). The PCCC guidelines are based on current California Children Services (CCS) standards for pediatric intensive care units (PICUs). The PTC guidelines are based on requirements for trauma centers as specified in California Trauma Care System regulations. However, in order to give local EMS agencies flexibility in identifying PTCs for field triage, referral and in some instances designation, this document does not distinguish levels of PTCs. Instead, it recognizes specific content areas (or facility performance features) where local needs and resources may justify variances from the stated requirements.

The PTC guidelines are consistent with recommendations by the American College of Surgeons for regional pediatric trauma centers, and with other national guidelines for pediatric trauma centers. This document does not address guidelines for the general trauma centers with pediatric commitment.



These guidelines use the term "shall" for items currently addressed by California regulation or statute. "Should" denotes a recommended level of performance that is not presently addressed by regulation or statute.

CCS-PICU Standards

In 1990, CCS adopted comprehensive standards for PICUs. These standards were endorsed by the California Pediatric Emergency and Critical Care Coalition and have been implemented throughout California. Both the PCCC and PTC guidelines include a CCS-approved PICU as a core component. The PCCC and PTC guidelines, therefore, augment and enhance current State CCS-PICU standards.

PCCC Guidelines

Current State CCS-PICU standards primarily focus on standards for PICUs. They do not include a number of key services needed in comprehensive pediatric critical care referral centers. Therefore, in addition to CCS-PICU standards, the PCCC guidelines include criteria for appropriate administration, services, staffing, policies and procedures, and quality improvement programs appropriate for specialized centers caring for children with critical illness. These guidelines were developed by the EMSC PCCC subcommittee in conjunction with the CCS PICU Advisory Committee. Standards from various projects in California as well as national guidelines were used in their development.

PTC Guidelines

A subcommittee of the EMSC project, composed of members of the Steering Committee of the California Pediatric Trauma Care Coalition, reviewed State trauma regulations, Guidelines from the American College of Surgeons, and PTC standards from various projects in California and nationally to develop specific guidelines for pediatric trauma centers. These guidelines identify optimal pediatric trauma center resources. Where indicated in the document, local EMS agencies may grant variances to address local needs and resources and still meet the EMS Authority's intent to ensure excellent quality of care to children.

Many pediatric critical care centers in California function as both PCCCs and PTCs, but not all PCCCs have a full range of pediatric trauma capabilities. All PTCs, however, should have basic pediatric critical care services. Hence, all PTCs should meet both the PCCC and PTC guidelines.



Not all counties and regions in California have hospitals that can qualify as PCCCs or PTCs. In regions that lack a PTC, general trauma centers may serve as the major referral centers for pediatric trauma. All EMS agencies should identify appropriate centers within or outside their boundaries to serve as referral centers for critically ill and injured children. The attached guidelines may be used by local EMS agencies to develop appropriate standards for their areas based on local needs and resources.

Relationship of PCCC and PTC Guidelines to other EMSC Guidelines

Despite improvements in pediatric critical care and pediatric trauma care and the development of specialized pediatric critical care and pediatric trauma centers, problems still remain in access to these services and linkages of these centers with community hospitals and other community emergency facilities. To address these problems, the EMSC project has

developed guidelines for local EMS agencies to help identify patients likely to benefit from specialized pediatric centers and to ensure that these centers are appropriately linked and coordinated within a pediatric emergency and critical care system.

Three previous sets of EMSC guidelines address access to and interfacility transport to specialized pediatric critical care and trauma centers or general trauma centers:

- (1) Interfacility Pediatric Trauma and Critical Care Consultation and/or Transfer Guidelines;
- (2) Model Pediatric Interfacility Transfer Agreement;
- (3) Guidelines for Pediatric Interfacility Transport Programs.

Summary

The attached PCCC and PTC guidelines are intended to assist local EMS agencies in the development of criteria for the designation of pediatric specialty centers. This will facilitate development of appropriate EMS policies for pediatric triage, patient destination, and transfer. When used in conjunction with other referenced EMSC guidelines for access and interfacility transport to regional referral centers, these guidelines will ensure that critically ill and injured children receive timely and quality care in an appropriate facility.



I. DEFINITIONS:

A. General

1. The terms used in this document to identify and define elements of Pediatric Trauma Centers (PTCs) are taken directly from the current California Trauma Care System Regulations. However, because the Regulations are not modified for PTCs or children hospitals specifically, a March 31, 1993 clarification of several pediatric-specific elements was issued by the California Emergency Medical Services (EMS) Authority. This communication is attached as Appendix I to this document. The clarifications address definitions of "Qualified Specialists" in emergency medicine at children's hospitals; "post graduate training programs"; and "formal affiliations" of residency programs.
2. The terms "expertise in pediatric trauma care," "pediatric trauma expertise," "expertise in pediatric critical care," and "pediatric expertise" mean pediatric training and/or experience as determined by the local EMS agency.

B. Pediatric Trauma Center (PTC)

1. California Trauma Care System Regulations define a PTC as either:
 - a. A licensed acute care hospital which usually treats persons fourteen (14) years of age or less, which meets all relevant criteria and has been designated as a pediatric trauma center, according to California Trauma Care System Regulations, or
 - b. The pediatric component of a trauma center with pediatric specialists and a pediatric intensive care unit (PICU) approved by California Children Services (CCS).
2. California EMS Authority Interpretations of California Trauma Care System Regulations clarify these definitions by stating that there are two types of hospitals which may be designated as pediatric trauma centers, those in children's hospitals and those in hospitals which provide specialized pediatric services. (Appendix A)



II. GUIDELINES FOR PEDIATRIC TRAUMA CENTERS

A. Hospital Organization

1. Characteristics of the Pediatric Trauma Service:

- a. An organized Department, Division, or Service of Pediatric Trauma.
- b. A multi-disciplinary pediatric trauma center committee should be established, to include interdepartmental and interdisciplinary representation such as representatives from the trauma service, pediatric intensive care unit, emergency department, pediatric surgery and surgical subspecialties, pediatrics and pediatric subspecialists, nursing, social services, respiratory therapy, transport service (if applicable), and other relevant services.
- c. A Pediatric Trauma Director
 - (1) A qualified specialist in pediatric surgery with expertise in pediatric trauma care.
 - (2) Responsibilities
 - (a) Direct the pediatric trauma service and provide leadership and coordination for pediatric trauma care.
 - (b) Coordinate PICU trauma care with the medical director of the PICU.
 - (c) Implement pediatric trauma center guidelines.
 - (d) Coordinate pediatric trauma care with other hospital and professional services.
 - (e) Coordinate with local and State EMS agencies.
 - (f) Direct pediatric trauma research program.
 - (g) Participate in administration and management of the trauma service budget.
- d. A designated pediatric trauma coordinator.



- (1) A registered nurse with a Baccalaureate degree in nursing or other health related field (Masters degree preferred) and training and experience in pediatric trauma care and administration.
- (2) Responsibilities:
Collaborate with the pediatric trauma director in the multidisciplinary implementation and administration of the pediatric trauma program including:
 - (a) Development of policies and procedures,
 - (b) Development, monitoring, and evaluation of continuous quality improvement program and patient care,
 - (c) Administration and management of trauma service budget,
 - (d) Maintenance and monitoring of the pediatric trauma registry and data base,
 - (e) Facilitation of interdisciplinary communication among health providers, patients, and families,
 - (f) Development of staff, prehospital, and community outreach and education programs,
 - (g) Development of policies for the assurance of timely referral to rehabilitative services,
 - (h) Liaison with local and State EMS agencies and other trauma centers, and
 - (i) Participation in pediatric trauma research program.

e. Trauma Team

A multidisciplinary team of physicians, nurses, and other personnel required to immediately evaluate and treat pediatric trauma patients.

- (1) The trauma team leader will be a staff pediatric surgeon with pediatric trauma expertise*, a staff trauma surgeon with pediatric trauma expertise*, or a general surgical resident who



has completed three years of training, with a staff pediatric surgeon with pediatric trauma expertise* or a staff trauma surgeon with pediatric trauma expertise*, on call and promptly available.

- (2) The remainder of the team should have adequate nursing, physician, and support personnel to appropriately evaluate, resuscitate, and stabilize pediatric trauma patients.

2. Department(s), Division(s), Service(s) or Section(s) that include at least the following specialties which are staffed by qualified specialists with pediatric expertise.

- a. Surgical Specialties

*As determined by the local EMS agency

- (1) Pediatric
 - (2) Cardiothoracic
 - (3) Gynecologic*
 - (4) Neurologic
 - (5) Ophthalmologic
 - (6) Oral/Maxillofacial
 - (7) Orthopedic
 - (8) Otorhinolaryngologic
 - (9) Plastic
 - (10) Urologic

- b. Non-Surgical/Medical Specialties

- (1) Pediatric Emergency Medicine
 - (2) Pediatric Critical Care
 - (3) Pediatric Anesthesiology
 - (4) Cardiology
 - (5) Gastroenterology



- (6) General Pediatrics
- (7) Hematology/Oncology
- (8) Infectious Disease
- (9) Neonatology
- (10) Neurology
- (11) Nephrology
- (12) Pathology
- (13) Psychiatric Services
- (14) Pulmonology
- (15) Radiology
- (16) Rehabilitation/Physical Medicine (as stated on page 14)

c. Other

- (1) Nursing
- (2) Social Services
- (3) Respiratory Care

B. Physician Staffing and Specialty Availability

1. Qualified specialists in-house 24-hours/day and immediately available at all times:

*May be provided through a written transfer agreement with a hospital that has a department, division, service, or section that provides this service.

a. Pediatric Surgery

The in-house requirement may be fulfilled by*:

- (1) A staff pediatric surgeon with expertise in pediatric trauma care, or
- (2) A staff trauma surgeon with expertise in pediatric trauma care, or
- (3) A senior general surgical resident who has completed at least



three years of surgical residency training and who is (a) capable of assessing emergent pediatric trauma situations, (b) capable of undertaking immediate surgical care, and (c) able to provide the overall control and surgical leadership necessary for the care of pediatric trauma patients. When a surgical resident is the responsible surgeon on call in-house:

- (a) A staff pediatric surgeon with expertise in pediatric trauma care or a staff trauma surgeon with expertise in pediatric trauma care shall be on call and promptly available; and
- (b) A staff pediatric surgeon, or a qualified staff surgeon with expertise in pediatric trauma care, shall be advised of all pediatric trauma admissions and present in the operating room for all pediatric trauma operative procedures and major resuscitation.

b. Emergency Medicine

The in-house requirement may be fulfilled by:

- (1) A qualified specialist in pediatric emergency medicine, or
- (2) A qualified specialist in emergency medicine with pediatric expertise, or

*Consistent with Section 100261 of Title 22 of the California Code of Regulations, the local EMS Agency may grant a variance from the in-house requirement, such that the in-house requirement may be fulfilled by surgeons outside the facility provided that local criteria be established that allows the surgeon to take call from outside the facility, but with the clear commitment on the part of the facility and the surgical staff that the surgeon will be present in the emergency department at the time of arrival of the trauma patient to supervise resuscitation and major therapeutic decisions, provide operative treatment, and be available to care for trauma patients in the PICU. Compliance with this requirement and applicable criteria must be monitored by the facility's CQI program.

- (3) A subspecialty resident in pediatric emergency medicine who has completed at least one year of subspecialty residency education in pediatric emergency medicine and who is (a) capable of assessing



emergency situations in pediatric trauma patients and (b) providing for initial resuscitation and stabilization. When this resident is the responsible emergency physician in-house:

- (a) A qualified specialist in pediatric emergency medicine, or emergency medicine with pediatric expertise, shall be promptly available.
- (b) The qualified specialist on call shall be notified of all patients who require significant resuscitation, operative surgical intervention, or intensive care unit admission.

c. Pediatric Critical Care

The in-house requirement may be fulfilled by:

- (1) A qualified specialist in pediatric critical care medicine, or
- (2) A qualified specialist in anesthesiology with expertise in pediatric critical care, or
- (3) A physician who has completed at least two years of residency in pediatrics. When this physician is the responsible pediatric critical care physician on call in-house:

- (a) A qualified specialist in pediatric critical care medicine, or a qualified specialist in anesthesiology with expertise in pediatric critical care, shall be on call, and promptly available.
- (b) The qualified specialist on call should be advised about all patients who may require admission to the PICU.

d. Anesthesiology

The in-house requirement may be fulfilled by*:

*Consistent with Section 100261 of Title 22 of the California Code of Regulations, the local EMS Agency may grant a variance from the in-house requirement such that anesthesiology may be promptly available provided that local



criteria be established to ensure that the anesthesiologist is in the operating room when the patient arrives. Compliance with this requirement and applicable criteria must be monitored by the facility's CQI program.

- (1) A qualified anesthesiologist with pediatric expertise, or
- (2) A resident in anesthesiology who has completed one year of anesthesiology residency and who is (a) capable of assessing emergency situations in pediatric trauma patients and (b) providing any indicated emergent anesthesia treatment. When an anesthesiology resident is the responsible anesthesiologist on call in-house:
 - (a) A qualified anesthesiologist with pediatric expertise shall be on call, and promptly available.
 - (b) The qualified anesthesiologist on call should be advised about all patients who may require anesthesia.
- (3) A qualified anesthesiologist with pediatric expertise shall be present in the operating room for all pediatric patients undergoing anesthesia.

e. Neurosurgery

The in-house requirement may be fulfilled by:

- (1) A staff neurosurgeon with expertise in pediatric neurotrauma*, or
- (2) A staff surgeon with expertise in pediatric neurotrauma as judged by the Chief of Neurosurgery.
- (3) A senior surgical resident who has completed at least three years of surgical residency training who is judged by the Chief of Neurosurgery to be (a) capable of assessing emergent pediatric neurotrauma, (b) capable of initiating measures directed at stabilization of the patient, (c) able to initiate diagnostic and therapeutic procedures. When a staff surgeon



or surgical resident is the responsible neurosurgeon on call in-house:

- (a) A staff neurosurgeon with expertise in pediatric neurotrauma*, who is dedicated to that hospital's trauma service, shall be on call and promptly available.
- (b) The qualified neurosurgeon on call should be advised of all pediatric neurotrauma admissions and present in the operating room for all pediatric neurotrauma operative procedures.

*As determined by the local EMS agency.

2. Qualified specialists with pediatric expertise on call and promptly available.

a. Surgical Specialties

- (1) Cardiothoracic
- (2) Gynecologic*
- (3) Hand, including microsurgery capability
- (4) Ophthalmologic
- (5) Oral/Maxillofacial
- (6) Orthopedic
- (7) Otorhinolaryngologic
- (8) Plastic
- (9) Urologic

b. Non-surgical/Medical Specialties

- (1) Neonatology
- (2) Nephrology (capable of providing dialysis for pediatric patients)
- (3) Pathology
- (4) Pediatric Cardiology
- (5) Pediatric Gastroenterology



- (6) Pediatric Hematology/Oncology
- (7) Pediatric Infectious Disease
- (8) Pediatric Neurology
- (9) Pediatrics
- (10) Psychiatric Services
- (11) Radiology

3. Specialists with pediatric expertise available for consultation. (May be provided through consultation or transfer agreement)

- a. Adolescent Medicine
- b. Allergy and Immunology
- c. Child Development
- d. Dentistry
- e. Endocrinology
- f. Genetics/Dysmorphology
- g. Obstetrics
- h. Neuroradiology

*May be provided through a written transfer agreement with a hospital that provides this service.

- i. Pediatric Pulmonology
- j. Rehabilitation/Physical Medicine (as stated on page 14)

4. Staff physicians and other professional personnel should have training and experience in pediatric trauma care.

C. Nursing Services/Administration

- 1. Nursing services that are staffed by qualified licensed nurses with education, experience, and demonstrated clinical competence in the care of critically ill and injured children.
- 2. Nursing services shall meet CCS-PICU standards and PCCC guidelines. (PCCC guidelines, p. 7)



D. Other Professional Services

Social services, respiratory care services, and other professional services as specified in CCS-PICU standards.

E. Emergency Department (ED)

Pediatric trauma centers shall have the following supplemental service which requires a special permit pursuant to California Code of Regulations, Title 22, Chapter 1, Articles 5 and 6:

1. A basic or comprehensive emergency department, division, or section staffed so that pediatric trauma patients are assured of immediate and appropriate initial care. Such staff shall include qualified specialists in pediatric emergency medicine, or emergency medicine with pediatric expertise, who are in-house and immediately available at all times. These physicians shall be capable of evaluating pediatric trauma patients, providing initial resuscitation and stabilization and performing necessary surgical procedures not requiring general anesthesia.
2. The emergency department should:
 - a. Meet PCCC ED guidelines. (PCCC guidelines, p. 8)
 - b. Provide physician staffing and specialty availability as specified in Section A and B of these guidelines.
 - c. Designate a physician with expertise in pediatric trauma management to be a member of the pediatric trauma team.

F. Surgical Service

1. An operating suite that is immediately available for major pediatric trauma patients and a plan for a back up operating suite that can be made available.
2. Staffing
 - a. In-house operating staff with pediatric training and/or experience who



- are immediately available at all times and a plan for back-up personnel who are on-call and promptly available when needed.
- b. Nursing personnel as specified in PCCC guidelines. (PCCC guidelines, p. 13).
- 3. Equipment, supplies, or capability appropriate for pediatric patients (neonatal to adult) including:
 - a. Cardiopulmonary bypass capability;
 - b. Thermal control equipment for patients and for blood and fluids;
 - c. X-ray capability including c-arm image intensifier available 24 hours a day;
 - d. Endoscopes including at least bronchoscopes, esophagoscopes and gastroscopes;
 - e. Craniotomy instruments;
 - f. Autotransfusion capability;
 - g. Equipment appropriate for fixation of long bone and pelvic fractures;
 - h. Pediatric crash cart; and
 - i. Operating microscope
 - 4. Postanesthetic care unit (PCCC guidelines, page. 13)
- G. Pediatric Intensive Care Unit approved by CCS
 - H. Special services and resources as specified in CCS-PICU standards and PCCC guidelines. (PCCC guidelines, p. 15)
 - I. Support Services
 - 1. In addition to licensure requirements and CCS-PICU standards, pediatric trauma centers should have the following service capabilities including technologists with appropriate pediatric experience:



a. Radiological service.

- (1) Certified radiological technologist in-house and immediately available at all times for general radiologic procedures;
- (2) Computerized tomography, for both head and body, with an in-house technologist who is immediately available at all times;
- (3) Angiography, with a technologist who is promptly available at all times;
- (4) Ultrasonography promptly available;
- (5) Nuclear scanning; and
- (6) Magnetic resonance imaging (MRI) available.*

b. Clinical laboratory services.

- (1) Comprehensive blood bank or access to a community central blood bank with the capability to provide autologous and designated donor blood transfusions; and must have adequate storage facilities and immediate availability of blood and blood products;
- (2) Clinical laboratory services as specified in CCS-PICU standards, including micro sampling techniques.
- (3) Clinical laboratory technologist in-house and immediately available at all times.

c. Rehabilitation services

In house consultation service for rehabilitation, when medically prudent, should be available, but further rehabilitation may be provided through a written transfer agreement with a pediatric rehabilitation center.

J. Policies as specified in CCS-PICU standards and PCCC guidelines, including organ procurement and child abuse and neglect. (PCCC guidelines, p. 16)



K. Continuous Quality Improvement Program (CQI):

1. An organized, coordinated, multidisciplinary CQI program for pediatric trauma patients for the purpose of improving patient outcome;

*May be provided through a written transfer agreement with a hospital that provides this service.

2. The CQI program should meet CCS-PICU standards and PCCC guidelines (PCCC guidelines, p. 17); and
3. The CQI program should include:
 - a. Audit of all pediatric trauma-related deaths, major complications, and transfers as well as additional pediatric quality of care outcome measures and focused audits;
 - b. Multidisciplinary trauma conferences that include all members of the pediatric trauma team, representatives from the ED and PICU, and representatives from other relevant services. Trauma conferences should be held at least once a month to critique selected pediatric trauma cases;
 - c. Participation in a trauma information management system for pediatric patients including a trauma registry;
 - d. Review of the appropriateness of prehospital treatment, triage, including trauma center bypass, transportation, and communications for pediatric patients.
 - e. Medical nursing audit, utilization review, tissue review; and
 - f. Published on-call schedule maintained for surgeons, neurosurgeons, orthopedic surgeons, and other major specialists.

L. Outreach, Education and Injury Prevention Programs

1. Programs as specified in PCCC guidelines. (PCCC guidelines, p. 17)
2. Outreach, education and injury prevention programs specifically related to pediatric trauma and injury prevention.



3. Formal continuing education programs in pediatric trauma care for affiliated trauma centers, receiving hospitals, and affiliated and referring hospitals.
4. Specific requirements for PTC staff continuing education in pediatric trauma care and formal continuing education programs in pediatric trauma for:
 - a. Staff physicians;
 - b. Staff nurses;
 - c. Staff allied health personnel; and
 - d. Local EMS personnel including at least EMT-Is, EMT-IIs, EMT-Ps.

M. Transfer Agreements

Written pediatric interfacility transfer agreements with all affiliated trauma care hospitals, other affiliated and referring hospitals, and with hospitals providing specialty services. (See section H, and PCCC guidelines, p. 15)

N. Post-Graduate Medical Training Programs (Appendix A)*

1. Approved and accredited post-graduate medical training program for residents at multiple levels of training in pediatrics.
2. Approved and accredited post-graduate medical training programs for residents at multiple levels of training in general surgery and anesthesiology or have formal affiliations with approved and accredited post-graduate medical training programs in surgery and anesthesiology as defined below:
 - a. The parent institution's training program is approved by the Accreditation Council of Graduate Medical Education (ACGME) and included, or eligible for inclusion, in the ACGME "green book."
 - b. The affiliating hospital is listed on the parent institution's formal application to the ACGME.
 - c. All affiliating rotations are documented in a formal letter of agreement between the affiliating hospital and the parent institution. The letter of agreement should specify the details of the rotation and assure that the



affiliation meets all of Title 22 requirements on a full time basis.

O. A Pediatric Trauma Research Program

A trauma research program should be designed to produce new knowledge applicable to the care of injured pediatric patients. This research may be conducted in a number of ways, including traditional laboratory and clinical research, reviews of clinical series, and epidemiologic or other studies.

Regardless of the approach, the study design should include the development and testing of a clearly defined hypothesis. Consistent publication of articles focused on a clinical problem in peer-reviewed journals is the distinguishing feature of an effective research program. A trauma research program should have an organizational structure that fosters and monitors such ongoing productivity. In addition to the publications mentioned above, presentation of results at local, regional, and national society meetings and ongoing studies approved by local human and animal research review boards are expected from productive programs.

*Consistent with Section 100261 of Title 22 of the California Code of Regulations, the local EMS Agency may grant a variance from this requirement.'



SUGGESTED READINGS

1. State of California, Title 22, Chapter 7: Trauma Care System Regulations. Sacramento, CA; 1986; and Interpretations of these regulations as they apply to pediatric trauma centers and children's hospitals; CA EMS Authority, March 31, 1993.
2. Committee on Trauma, American College of Surgeons: Resources for the Optimal Care of the Injured Patient. 1994 (In press).
3. American College of Surgeons: Draft Standards for Pediatric Trauma Centers, 1993. Personal communication.
4. Vane, DW and Eichelberger, MR: Pediatric Trauma Centers, Chapter 27. Pediatric Emergency Care Systems Planning and Management. Dieckmann, RA (ed.): Williams and Wilkins, Baltimore, MD; 1992, 300-315
5. Pediatric Trauma Standards: Pennsylvania Trauma Systems Foundation Standards for Trauma Center Accreditation. 1991-95.
6. American Medical Association Commission on Emergency Medical Services: Pediatric Emergencies. Pediatrics; 1990,85:879-887.
7. California Children Services: Standards for Pediatric Intensive Care Units (PICUs). California Department of Health Services; Sacramento, CA; 1990
8. Pediatric Intensive Care Network of Northern and Central California: Standards for Pediatric Critical Care Centers and Pediatric Trauma Centers. Santa Cruz, CA; 1990
9. Pettigrew, AH and Moody RR: Pediatric Critical Care Systems, Chapter 25. Pediatric Emergency Care Systems Planning and Management. Dieckmann, RA (ed.): Williams and Wilkins, Baltimore, MD; 1992, 279-284
10. Henderson, DP and Seidel, JS (eds.): Emergency Medical Services for Children: Development and Integration of Pediatric Emergency Care into EMS Systems. EMSC; Los Angeles, CA; 1989



11. Sierra-Sacramento Valley EMS Agency: Pediatric Critical Care System Plan, Standards for Pediatric Trauma Centers. Sacramento, CA; 1989.
12. Ramenofsky, ML and Moorese, TS: Standards of Care for the Critically Injured Pediatric Patient. The Journal of Trauma; 1982;22:921-933.



APPENDIX A

March 31, 1993

James M. Betts, M.D.
Chief, Division of Pediatric Surgery
Children's Hospital Oakland
747 Fifty Second Street
Oakland, CA 94609

Dear Dr. Betts:

This is in response to the California Pediatric Trauma Care Coalition's request for interpretation and application of the State Trauma Care System regulations as they pertain to hospitals who exclusively provide services to children.

The Authority is aware that the regulations do not set specific requirements for pediatric trauma centers and that some requirements may not be possible for children's hospitals. At this time we do not intend to amend the regulations but hope that our clarifications will help.

Your questions were as follows:

1. *Can physicians who are qualified specialists in Pediatric Emergency Medicine (as defined in Section 100244 of the Trauma Regulations) meet the Emergency Medicine Physician requirements for Level I and Level II trauma centers in hospitals that exclusively provide services to children?*

EMS Authority Response

Section 100260(a)(3) requires that Level I trauma centers have "an emergency department, division, service, or section staffed so that trauma patients are assured of immediate and appropriate initial care. Such staff shall include qualified specialists in surgery or emergency medicine." Section 100261(a)(3) defines the same requirement for Level II trauma centers. Section 100244 defines "qualified specialist", including surgical and non-surgical, as individuals who have appropriate training and are board certified.

Since the regulations do not require an individual who is board certified in Emergency Medicine be present, an individual who is board certified in Pediatric Emergency Medicine could be determined to be a "qualified specialist" and, in a pediatric facility, could be determined to meet the requirement of a qualified specialist in emergency medicine.

2. *Can post-graduate training programs in pediatrics approved by the ACGME satisfy the intent of State Trauma Regulations pertaining to residency training programs in internal medicine in children's hospitals?*

EMS Authority Response

Section 100260(f) states that "a Level I trauma center shall have an (sic) approved and accredited postgraduate medical training programs for residents at multiple levels of training in general surgery, internal medicine and anesthesiology." Section 100246 defines a residency program as one "which has been approved by the appropriate Residency Review Committee of the Accreditation Council on Graduate Medical Education."

Since internal medicine can be defined as "non-surgical treatment of adults" and general pediatrics can be defined as "non-surgical" treatment of children", then general pediatrics may be seen as a functional equivalent for children's hospitals and would meet the intent of the regulations.

3. *Can residency rotations that meet the listed conditions (parent program is ACGME approved, affiliating hospital is on listed parent's ACGME application, formal agreement between hospitals) satisfy the definition of "formal affiliation" and thereby meet the intent of State Trauma Regulations pertaining to residency training programs in anesthesiology and general surgery in children's hospitals?*

EMS Authority Response

A prospective trauma center that meets the listed conditions will functionally be able to provide residency training in the same way as one with its own training program. Therefore, it should be determined to meet this requirement.

4. *Does Section 100242 mean that hospitals seeking designation as a pediatric trauma center (i.e., a pediatric tertiary critical care center for pediatric trauma) must provide pediatric specialists and a CCS-approved PICU?*

EMS Authority Response

Section 100242 defines a pediatric trauma center as "(a) a licensed acute care hospital which usually

treats persons fourteen years of age or less, which meets all relevant criteria and has been designated as a pediatric trauma center, according to this Chapter; or (b) the pediatric component of a trauma center with pediatric specialists and a pediatric intensive care unit approved by California Children Services." This definition provides for two types of pediatric trauma centers--those in children's hospitals and those in hospitals which provide specialized pediatric services. Hospitals seeking designation as a pediatric trauma center that are not children's hospitals must provide pediatric specialists and a pediatric intensive care unit approved by California Children Services

5. a) *Could qualified specialists in Pediatric Critical Care Medicine be recognized as essential pediatric specialists in pediatric tertiary care critical care centers for pediatric trauma patients (pediatric trauma centers)?*
- b) *Could qualified specialists in Pediatric Critical Care Medicine be considered members of the multi-disciplinary trauma team in pediatric tertiary care critical care centers for pediatric trauma patients (pediatric trauma centers)?*

EMS Authority Response

The trauma regulations, except within the definition of "Pediatric Trauma Center," do not establish specific requirements for pediatric trauma centers. These standards are now left up to the designating authority (local EMS agency). The local EMS agency in its trauma care system plan and its request for proposals (or equivalent document) could require utilization of qualified specialists in Pediatric Critical Care Medicine and could also identify who should be on the multi-disciplinary trauma team.

If you have any questions regarding these issues, please contact Ms. Maureen McNeil of my staff.

Sincerely,

Joseph E. Morales, M.D., MPA

cc: Local EMS Agencies

Appendix B
GUIDELINES FOR PEDIATRIC CRITICAL CARE CENTERS

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EMERGENCY MEDICAL SERVICES FOR CHILDREN

California EMS Authority

Guidelines For Pediatric Critical Care Centers



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EMERGENCY MEDICAL SERVICES FOR CHILDREN

California EMS Authority

Guidelines For Pediatric Critical Care Centers



GUIDELINES FOR PEDIATRIC CRITICAL CARE CENTERS

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Introduction

Regional referral centers with specialized personnel, facilities, and services for critically ill and injured children are an essential component of EMS for Children (EMSC) systems. Children may have rapidly progressive illnesses and injuries which often differ from adults in etiology, pathophysiology, and management. Specialized pediatric diagnostic techniques, physiologic monitoring, life support systems, medications, and treatments are often required.

There have been significant recent advances in pediatric critical care medicine and pediatric trauma care. Specialized training programs and certification in pediatric critical care have been established for physicians and other health professionals. As a result, highly specialized centers for the care of critically ill and injured children have developed throughout California and the United States. A persuasive body of data now appears to indicate that pediatric morbidity and mortality can be reduced when critically ill and injured children, particularly children requiring intensive care, are rapidly transported to appropriate centers with pediatric critical care and pediatric trauma services.

A number of local EMS agencies in California have established standards for specialized pediatric critical care and pediatric trauma centers. However, there are no statewide guidelines available that can be used as a basis for standardization of center resources and for regional referral center designation. This document provides two sets of guidelines. (1) Guidelines for Pediatric Critical Care Centers (PCCC) and (2) Guidelines for Pediatric Trauma Centers (PTC). The PCCC guidelines are based on current California Children Services (CCS) standards for pediatric intensive care units (PICUs). The PTC guidelines are based on requirements for trauma centers as specified in California Trauma Care System regulations. However, in order to give local EMS agencies flexibility in identifying PTCs for field triage, referral and in some instances designation, this document does not distinguish levels of PTCs. Instead, it recognizes specific content areas (or facility performance features) where local needs and resources may justify variances from the stated requirements.

The PTC guidelines are consistent with recommendations by the American College of Surgeons for regional pediatric trauma centers, and with other national guidelines for pediatric trauma centers. This document does not address guidelines for the general trauma centers with pediatric commitment.



These guidelines use the term "shall" for items currently addressed by California regulation or statute. "Should" denotes a recommended level of performance that is not presently addressed by regulation or statute.

CCS-PICU Standards

In 1990, CCS adopted comprehensive standards for PICUs. These standards were endorsed by the California Pediatric Emergency and Critical Care Coalition and have been implemented throughout California. Both the PCCC and PTC guidelines include a CCS-approved PICU as a core component. The PCCC and PTC guidelines, therefore, augment and enhance current State CCS-PICU standards.

PCCC Guidelines

Current State CCS-PICU standards primarily focus on standards for PICUs. They do not include a number of key services needed in comprehensive pediatric critical care referral centers. Therefore, in addition to CCS-PICU standards, the PCCC guidelines include criteria for appropriate administration, services, staffing, policies and procedures, and quality improvement programs appropriate for specialized centers caring for children with critical illness. These guidelines were developed by the EMSC PCCC subcommittee in conjunction with the CCS PICU Advisory Committee. Standards from various projects in California as well as national guidelines were used in their development.

PTC Guidelines

A subcommittee of the EMSC project, composed of members of the Steering Committee of the California Pediatric Trauma Care Coalition, reviewed State trauma regulations, Guidelines from the American College of Surgeons, and PTC standards from various projects in California and nationally to develop specific guidelines for pediatric trauma centers. These guidelines identify optimal pediatric trauma center resources. Where indicated in the document, local EMS agencies may grant variances to address local needs and resources and still meet the EMS Authority's intent to ensure excellent quality of care to children.



Many pediatric critical care centers in California function as both PCCCs and PTCs, but not all PCCCs have a full range of pediatric trauma capabilities. All PTCs, however, should have basic pediatric critical care services. Hence, all PTCs should meet both the PCCC and PTC guidelines.

Not all counties and regions in California have hospitals that can qualify as PCCCs or PTCs. In regions that lack a PTC, general trauma centers may serve as the major referral centers for pediatric trauma. All EMS agencies should identify appropriate centers within or outside their boundaries to serve as referral centers for critically ill and injured children. The attached guidelines may be used by local EMS agencies to develop appropriate standards for their areas based on local needs and resources.

Relationship of PCCC and PTC Guidelines to other EMSC Guidelines

Despite improvements in pediatric critical care and pediatric trauma care and the development of specialized pediatric critical care and pediatric trauma centers, problems still remain in access to these services and linkages of these centers with community hospitals and other community emergency facilities. To address these problems, the EMSC project has developed guidelines for local EMS agencies to help identify patients likely to benefit from specialized pediatric centers and to ensure that these centers are appropriately linked and coordinated within a pediatric emergency and critical care system.

Three previous sets of EMSC guidelines address access to and interfacility transport to specialized pediatric critical care and trauma centers or general trauma centers:

- (1) Interfacility Pediatric Trauma and Critical Care Consultation and/or Transfer Guidelines;
- (2) Model Pediatric Interfacility Transfer Agreement;
- (3) Guidelines for Pediatric Interfacility Transport Programs.

Summary

The attached PCCC and PTC guidelines are intended to assist local EMS agencies in the development of criteria for the designation of pediatric specialty centers. This will facilitate development of appropriate EMS policies for pediatric triage, patient destination, and transfer. When used in



conjunction with other referenced EMSC guidelines for access and interfacility transport to regional referral centers, these guidelines will ensure that critically ill and injured children receive timely and quality care in an appropriate facility.



GUIDELINES FOR PEDIATRIC CRITICAL CARE CENTERS

I. DEFINITIONS:

A. Pediatric Critical Care Center

A Pediatric Critical Care Center (PCCC) is a licensed acute care hospital that provides specialized tertiary-level pediatric critical care personnel and services and serves as a regional referral center for critically ill and, in some instances, critically injured children. PCCCs should provide a Pediatric Intensive Care Unit (PICU) that meets California Children Service (CCS) standards, a broad spectrum of pediatric medical and surgical sub-specialists and subspecialty services, a licensed pediatric service, an emergency department capable of managing complex pediatric emergencies, and community outreach services including pediatric critical care consultation, pediatric transport services, and outreach education programs for community health practitioners.

Some PCCCs may also provide other specialized pediatric services such as pediatric trauma care, pediatric cardiac surgery, and pediatric rehabilitation services. PCCCs providing these services should meet appropriate CCS and other state standards and guidelines for these services.

B. Other Definitions:

1. "Available" or "available for consultation" means agreeing to respond to the pediatric critical care center in order to provide a defined service. May be provided through a written transfer agreement.
2. The terms "expertise in pediatric emergency medicine," "expertise in pediatric critical care," "pediatric expertise," and "proficiency in the care of pediatric patients" mean pediatric training and/or experience as determined by the local EMS agency.
3. "Immediately" or "immediately available" means (a) unencumbered by conflicting duties or responsibilities; (b) responding without delay when notified;



- and (c) being within the specified area of the pediatric critical care center.
4. "On-call" means agreeing to be available to respond to the pediatric critical care center in order to provide a defined service.
 5. "Promptly" or "promptly available" means being within the trauma receiving area, emergency department, operating room, PICU, or other specified area of the pediatric critical care center within a period of time that is medically prudent and proportionate to the patient's condition and such that the interval between the request for specialty availability and the arrival of the respondent should not have a measurably harmful effect on the course of patient management or outcome.
 6. "Qualified specialist" or "qualified surgical specialist" or "qualified non-surgical specialist" means a physician licensed in California who has (1) taken special postgraduate medical training, or has met other specified requirements, and (2) has become board certified within six (6) years of qualification for board certification in the corresponding specialty, for those specialties that have board certification and are recognized by the American Board of Medical Specialties.

II. SUPPLEMENTAL GUIDELINES FOR PEDIATRIC CRITICAL CARE CENTERS

A PCCC should meet CCS-PICU Standards and the following Supplemental Guidelines for Pediatric Critical Care Centers.

A. Hospital organization should include the following:

1. A Multidisciplinary Pediatric Critical Care Center Committee
 - a. The committee should include interdepartmental and interdisciplinary representation such as representatives from the pediatric intensive care unit, emergency department, pediatric surgery and surgical subspecialties, pediatrics and pediatric subspecialties, nursing, social services, respiratory therapy, transport service, and other relevant services.



- b. The committee should provide for (1) the implementation of PCCC guidelines, (2) coordination of pediatric critical care services across departmental and disciplinary lines, (3) the implementation of a comprehensive, multidisciplinary continuous quality improvement (CQI) program, and (4) coordination with local and State agencies.
 - 2. Department(s), Division(s), Service(s), or Section(s) which are staffed by qualified specialists with proficiency in the care of pediatric patients as specified in Section II B of these guidelines.
- B. Physician staffing and specialty availability should include the following:
 - 1. Qualified specialists in-house 24-hours/day and immediately available at all times for the care of pediatric patients:
 - a. A qualified specialist in emergency medicine, pediatric emergency medicine, or pediatrics with expertise in pediatric emergency medicine on duty in the emergency department; and
 - b. A physician skilled in pediatric airway management and the management of emergencies in the PICU who is immediately available to the PICU. This requirement may be fulfilled by a physician who is:
 - (1) A qualified specialist in pediatric critical care medicine, a qualified specialist in anesthesiology with expertise in pediatric critical care, or a qualified pediatric subspecialist with expertise in pediatric critical care.
 - (2) A physician who has completed at least two years of residency in pediatrics, at least one year of residency in anesthesiology, or at least two years of residency in emergency medicine.
 - (3) A qualified specialist in pediatric critical care medicine or anesthesiology with expertise in pediatric critical care must be on call and promptly available at all times. The qualified



specialist on call should be advised about all patients who may require admission to the PICU.

2. Qualified specialists on call and promptly available:
 - a. Pediatric critical care medicine or anesthesiology with expertise in pediatric critical care;
 - b. Pediatric surgery;
 - c. Neurological surgery with proficiency in the care of pediatric patients; and
 - d. Anesthesiology with proficiency in the care of pediatric patients.
3. Qualified specialists with pediatric expertise on call:
 - a. Surgical Specialties
 - (1) Cardiothoracic
 - (2) Ophthalmologic
 - (3) Orthopedics
 - (4) Otorhinolaryngologic
 - (5) Plastic and/or maxillofacial
 - (6) Urologic
 - b. Non-Surgical/Medical Specialties
 - (1) Endocrinology
 - (2) Neonatology
 - (3) Nephrology (capable of providing dialysis for pediatric patients)
 - (4) Pathology
 - (5) Pediatric Cardiology
 - (6) Pediatric Gastroenterology



- (7) Pediatric Hematology/Oncology
- (8) Pediatric Infectious Disease
- (9) Pediatric Neurology
- (10) Psychiatric Services
- (11) Radiology

4. Specialists with pediatric expertise available for consultation (may be provided through consultation or transfer agreement).

- a. Adolescent Medicine
- b. Allergy/Immunology
- c. Child Development
- d. Dentistry
- e. Genetics/Dysmorphology
- f. Gynecologic Surgery/Obstetrics
- g. Neuroradiology
- h. Pediatric Pulmonology
- i. Pediatric Rehabilitation/Physical Medicine

C. Nursing services/administration should include the following:

- 1. Nursing services that are staffed by qualified nurses with education, experience, and demonstrated clinical competence in the care of critically ill and injured children.
- 2. The PICU nursing services should meet CCS-PICU standards and should also include the following:
 - a. A nurse manager who will:
 - (1) Ensure coordination of pediatric critical care nursing services across departmental and interdisciplinary lines;
 - (2) Serve as the administrative nursing contact person with



hospitals served by the PCCC; and

- (3) Ensure that appropriate pediatric critical care specialty in-service and formal education programs are provided.
- b. PICU clinical nurse specialist (CNS)/clinical nurse educator (Masters prepared) who will:
- (1) Provide or participate in direct patient care, consultation, research and education related to the care of critically ill and injured pediatric patients, and
 - (2) Collaborate with the nurse managers, administrator, and physicians in establishing and maintaining standards of care for critically ill and injured pediatric patients.
- c. Designated charge nurses, and
- d. Qualified nurses with education, experience and demonstrated clinical competence in the treatment and care of critically ill/injured children. Training should include:
- (1) Nursing care of the child with multisystem disease;
 - (2) CPR-advanced program, PALS or equivalent;
 - (3) Respiratory care of the pediatric patient;
 - (4) Patient vascular access;
 - (5) Pediatric monitoring;
 - (6) Other areas specific to services provided by individual PCCCs (e.g., cardiac surgery, trauma); and
 - (7) Compliance with all other CCS-PICU nursing standards.
- D. Other professional services including social services, respiratory care services, and other professional services as specified in CCS-PICU standards.



E. Emergency Department (ED)

1. A PCCC should have the following supplemental service which requires a special permit pursuant to California Code of Regulations, Title 22, Chapter 1, Articles 5 and 6.

A basic or comprehensive emergency department, division, service or section staffed so that it is capable of managing complex pediatric emergencies. The emergency department physicians should be capable of evaluating critically ill and injured children, providing initial resuscitation and stabilization, and performing necessary surgical procedures not requiring general anesthesia.

2. ED Medical Administration

- a. Medical director for the ED who is a qualified specialist in emergency medicine, pediatric emergency medicine, or pediatrics.
- b. Physician coordinator for pediatric emergency services*

- (1) Qualifications:

- (a) Qualified specialist in emergency medicine, pediatric emergency medicine, or pediatrics with expertise in pediatric emergency medicine.

- (2) Responsibilities in collaboration with the medical director of the ED:

- (a) Medical direction and leadership including serving as a clinical resource in pediatric emergency services;
 - (b) Development of policies and procedures for pediatric emergency services;
 - (c) Development and supervision of pediatric emergency education programs (e.g., PALS or APLS) for hospital personnel,



- outreach programs, community hospitals and health care providers, and prehospital personnel;
 - (d) Development of a pediatric ED CQI plan and monitoring of pediatric CQI activities;
 - (e) Coordination with other hospital departments, divisions, services, sections;
 - (f) Coordination with EMS agencies; and
 - (g) Verification of credentials and training of ED MDs as they relate to proficiency in the care of pediatric patients.
3. ED Nursing Administration
- a. A PCCC should have ED nursing service(s) that are staffed by qualified nurses with education, experience, and demonstrated clinical competence in the care of critically ill/injured children.
 - b. The ED nursing services should include:
 - (1) An ED nurse manager

*May be met by a staff physician currently assigned other roles in the emergency department.

- (2) A nursing coordinator for pediatric emergency care (for example, a pediatric liaison nurse - PDLN)*
 - (a) Qualifications
 - (1) At least two (2) years experience in pediatric emergency or pediatric critical care nursing within the previous five (5) years;
 - (2) Should complete PALS, APLS or other equivalent pediatric emergency nursing course; and
 - (3) Complete continuing education in topics related to pediatric emergency care.



(b) Responsibilities in collaboration with the nurse manager of the ED:

- (1) Ensure coordination of pediatric emergency and critical care nursing services across departmental and interdisciplinary lines;
- (2) Collaborate with the pediatric critical care team to ensure quality of care for all critically ill or injured pediatric patients;
- (3) Serve as ED nursing contact person with hospitals served by the PCCC; and
- (4) Ensure that appropriate pediatric emergency and critical care specialty inservice and formal education programs are provided.

(c) Responsibilities in collaboration with the physician coordinator for pediatric emergency services:

- (1) Develop policies and procedures for pediatric emergency services;
- (2) Assist in the development and implementation of ED CQI activities;

*May be met by a staff nurse currently assigned other roles in the emergency department.

- (3) Ensure that pediatric emergency training programs (PALS, APLS or other equivalent pediatric emergency course) are available for hospital personnel, community hospitals and health care providers, and prehospital personnel;
- (4) Coordinate services with EMS agencies and referring hospitals; and
- (5) Ensure clinical competence of ED RNs in the



care of critically ill/injured children and document ED nursing continuing education in pediatrics.

4. ED Personnel - Physicians

a. Physician staffing:

(1) In-house 24-hours/day on duty in the ED

- (a) At least one qualified specialist in emergency medicine, pediatric emergency medicine, or pediatrics with expertise in pediatric emergency medicine, or
- (b) A subspecialty resident in pediatric emergency medicine who has completed at least one year of subspecialty residency education in pediatric emergency medicine, and who is (a) capable of assessing emergency situations in pediatric patients and (b) providing for initial resuscitation and stabilization. When this resident is the responsible emergency physician in-house:

- (1) A qualified specialist in pediatric emergency medicine, emergency medicine with pediatric expertise, or pediatrics with expertise in pediatric emergency medicine should be on call and promptly available.
- (2) The qualified specialist on call should be notified of all patients who require significant resuscitation, operative surgical intervention, or intensive care unit admission.



- (2) Additional emergency physician (similarly qualified) promptly available to the ED when needed.

b. Qualifications/Education:

- (1) Qualified specialist in emergency medicine or pediatric emergency medicine; or
- (2) ED physicians who are not qualified specialists in emergency medicine or pediatric emergency medicine should have expertise in pediatric emergency medicine and should complete within 12 months at least a PALS or APLS course; and
- (3) All ED physicians should complete continuing education in topics related to pediatric emergency medicine. (May be fulfilled by completing a PALS or APLS course.)

c. Backup physician specialty services

- (1) Designated pediatric consultant on-call and promptly available to the ED 24 hours/day;
- (2) A list of qualified specialists on call for consultation at all times. (Title 22, California Code of Regulations). The list should include specialists listed in Section II.B of the PCCC guidelines; and
- (3) A PCCC that is not also a Pediatric Trauma Center (PTC) should have a formal relationship with a PTC or a general trauma center which includes the availability of 24-hour telephone consultation with pediatric trauma specialists and a written transfer agreement with the trauma center.

5. ED Personnel - Nurses

a. Qualifications/Education



- (1) At least one ED RN per shift educated in PALS, APLS or other equivalent pediatric emergency nursing course; and
 - (2) All RNs regularly assigned to the ED should complete continuing education in topics related to pediatric emergency care.
6. ED equipment, supplies, and medications
 - a. In addition to items listed in Appendix I, a PCCC should have the following:
 - (1) Monitoring equipment
 - (a) Intracranial pressure monitoring system immediately available to the ED.
 - (b) Intravascular pressure monitoring system in the ED.
 - (2) Specialized pediatric trays or kits
 - (a) Thoracotomy tray in the ED
 - (b) Intracranial pressure monitoring kit immediately available to the ED.
 - (3) Cervical and extremity immobilization equipment or devices suitable for pediatric patients in the ED.
7. ED Continuous Quality Improvement (CQI) program for pediatric patients as specified in Section K, page 17.
8. Policies as specified in Section J, page 16.
9. Other ED requirements:
 - a. Communications: Two-way communication capability with the EMS



system in accordance with local EMS policies and procedures, and a dedicated phone line to communicate with other hospitals for patient information such as transfers and patients arriving by paramedic ambulance.

- b. Current references and resource documents and treatment protocols, including medication dosages and ET tube sizes and airway chart.

F. Surgical Service/Post Anesthetic Care Unit (PACU) should include the following:

- 1. An operating suite available within the main operating room for pediatric emergencies;
- 2. Surgery and PACU nursing services that are staffed by qualified nurses with education, experience, and demonstrated clinical competence in the care of critically ill/injured children.
 - a. A nurse manager (s) who should:
 - (1) Collaborate with the pediatric critical care team to ensure quality care for all acutely ill or injured pediatric patients;
 - (2) Ensure that appropriate pediatric critical care specialty inservice and formal education programs are provided;
 - (3) Participate in the development of policies and procedures for pediatric surgical services; and
 - (4) Ensure clinical competencies of OR/PACU RNs in the care of critically ill and injured children.
 - b. All RNs who care for pediatric patients in the OR or PACU should complete continuing education in topics related to pediatric surgery or pediatric perioperative care;
 - c. Staffing 24 hours per day by RNs qualified to care for pediatric patients requiring and/or recovering from anesthesia for:



- (1) Neurosurgery;
 - (2) Orthopedic surgery;
 - (3) Cardiothoracic surgery;
 - (4) Burns; and
 - (5) General surgery
 3. Equipment and supplies appropriate for pediatric patients (neonatal to adult);
 4. Appropriate anesthesia personnel, services and equipment for pediatric patients;
 5. Post-anesthesia care (may be provided in the PACU or the PICU) with appropriate personnel and pediatric equipment for monitoring and resuscitation for pediatric patients including:
 - a. Equipment for the continuous monitoring of temperature, hemodynamics, and gas exchange.
 - b. Equipment for the continuous monitoring of intracranial pressure
 - c. Pulse oximetry
 - d. End-tidal CO₂ determination
 - e. Thermal Control
 6. A continuous quality improvement (CQI) program for pediatric patients as specified in Section K, page 17; and
 7. Policies as specified in Section J, page 16.
- G. Pediatric Intensive Care Unit approved by California Children Services
- H. Special services/resources should include the following:
1. A PCCC should have the following additional specialty services or programs with personnel and services appropriate for pediatric patients:
 - a. Burn care management capability or written transfer agreement with a



- burn center;
- b. Acute spinal cord injury management capability or written transfer agreement with a spinal cord injury center;
- c. Acute hemodialysis capability or a written transfer agreement with a facility with a hemodialysis unit;
- d. Peritoneal dialysis capabilities;
- e. CCS-approved regional neonatal intensive care unit (NICU) or written transfer agreement with a CCS-approved regional NICU;
- f. Access to a poison control center;
- g. Suspected child abuse and neglect team (SCAN);
- h. Physical therapy service with expertise in the care of pediatric patients;
- i. Pediatric rehabilitation service. In house consultation service for immediate or acute rehabilitation, when medically prudent, should be available, but further rehabilitation may be provided through a written transfer agreement with a pediatric rehabilitation center;
- j. An organized pediatric interfacility transport program; and
- k. Aeromedical transport plan with designated landing site; and
- l. Child Life program.

I. Support services should include the following:

- 1. In addition to licensure and CCS PICU requirements, a PCCC should have the following service capabilities including technologists with appropriate pediatric experience:
 - a. Radiological services:
 - (1) Certified radiological technologist in-house and immediately available at all times for general radiological procedures;
 - (2) Computerized tomography, for both head and body, with a technologist who is promptly available at all times;



- (3) Angiography with a technologist who is promptly available at all times;
- (4) Ultrasonography promptly available;
- (5) Nuclear scanning; and
- (6) Magnetic resonance imaging (MRI) available.

b. Clinical laboratory services:

- (1) Comprehensive blood bank or access to a community central blood bank, with the capability to provide autologous and designated donor blood transfusions; and must have adequate storage facilities and immediate availability of blood and blood products;
- (2) Clinical laboratory services as specified in CCS-PICU standards; and
- (3) Clinical laboratory technologist in-house and promptly available.

J. Policies should include the following:

1. A PCCC should have policies and procedures to assure appropriate care and coordination of services for critically ill and injured children.
2. The ED, PICU, surgical services, and other departments, divisions, services, and sections involved in pediatric emergency and critical care should have the following policies and procedures as applicable to the services provided:
 - a. Triage, admission, transfer, and discharge;
 - b. Availability of physician and other personnel;
 - c. In-house and interfacility pediatric transport;
 - d. General assessment;
 - e. Patient monitoring;
 - f. Physician and non-physician qualifications and privileges;



- g. Infection control and patient isolation;
- h. Safety;
- i. Resuscitation and no resuscitation;
- j. Life support techniques (e.g., mechanical ventilation);
- k. Consent;
- l. Coordination of medical care;
- m. Physical and sexual child abuse and child neglect;
- n. Pediatric pain management and conscious sedation;
- o. Organ or tissue donation, procurement, and transplantation;
- p. Rehabilitation;
- q. Discharge planning to include illness and injury prevention;
- r. Disaster plan;
- s. Death; and
- t. Care of the grieving family.

K. Continuous Quality Improvement Program (CQI) should include the following:

- 1. All departments, division, services, and sections involved in pediatric emergency and critical care should have an organized pediatric CQI program appropriate for the services provided.
- 2. The PCCC should have an organized, coordinated, multidisciplinary CQI program for pediatric patients for the purpose of improving patient outcome and coordinating all pediatric emergency and critical care CQI activities.
- 3. The PCCC CQI program should develop methods for:
 - a. Tracking all critically ill/injured pediatric patients;
 - b. Developing indicators/ monitors for reviewing and monitoring patient care, including all deaths, major complications, and transfers;
 - c. Integrating findings from CQI audits and critiques into patient standards of care and education programs; and
 - d. Integrating reviews of prehospital, ED, trauma, inpatient pediatrics, pediatric critical care, pediatric surgical care and pediatric transport



CQI activities.

4. Mechanisms to monitor professional education.

L. Outreach and education programs should include the following:

1. All departments, divisions, services, and sections involved in pediatric emergency and critical care should develop outreach and education programs appropriate for the services provided.
2. Outreach programs shall include telephone and on-site consultations with physicians, nurses, and other health care providers in the community and outlying areas and with affiliated and referring institutions.
3. Specific requirements for continuing education in pediatric emergency and critical care for PCCC staff and formal continuing education programs in pediatric emergency and critical care for:
 - a. Staff physicians;
 - b. Staff nurses;
 - c. Staff allied health personnel;
 - d. Local EMS personnel including at least EMT-Is, EMT IIs, and EMT-Ps;
 - e. Other community physicians, nurses, and health care personnel; and
 - f. Affiliated and referring hospitals.
4. Public education and illness/injury prevention education.

M. Transfer Agreements

PCCCs should have written pediatric interfacility transfer agreements with affiliated and referring hospitals and with hospitals providing specialty services listed in Section H.



SUGGESTED READINGS

Pediatric Critical Care Center Standards

1. California Children Services: Standards for Pediatric Intensive Care Units (PICUs). California Department of Health Services; Sacramento, CA; 1990
2. Pediatric Intensive Care Network of Northern and Central California: Standards for Pediatric Critical Care Centers and Pediatric Trauma Centers. Santa Cruz, CA; 1990
3. Pettigrew, AH and Moody RR: Pediatric Critical Care Systems, Chapter 25. Pediatric Emergency Care Systems Planning and Management. Dieckmann, RA (ed.): Williams and Wilkins, Baltimore, MD; 1992,279-294
4. Henderson, DP and Seidel, JS (eds.): Emergency Medical Services for Children: Development and Integration of Pediatric Emergency Care into EMS Systems. EMSC; Los Angeles, CA; 1989
5. EMS Division, Fresno County Health Department: Administrative Policies and Procedures, Pediatric Critical Care Center Designation. Fresno, CA; 1993
6. Sierra-Sacramento Valley EMS Agency: Pediatric Critical Care System Plan, Standards for Pediatric Critical Care Centers. Sacramento, CA; 1989
7. Society of Critical Care Medicine/American Academy of Pediatrics: Guidelines and Levels of Care for Pediatric Intensive Care Units. 1993 (Personal Communication)
8. American Medical Association Commission on Emergency Medical Services: Pediatric Emergencies. Pediatrics: 1990, 85:879-887
9. Emergency Medical Services Section, Department of Health and Social Services: Wisconsin 1989 Categorization Report: Summary of Emergency Care Capabilities of Wisconsin



Hospitals. Madison, WI; 1989.

10. Pediatric Emergency Medical Services Advisory Board: A Plan for Regionalization: Emergency Medical Services for Children in Oregon and Southwest Washington. Health Division, Oregon Department of Human Resources; 1988, Appendix Cf.



APPENDIX A

STANDARDS FOR PEDIATRIC CRITICAL CARE CENTERS EQUIPMENT, SUPPLIES, AND MEDICATIONS FOR THE CARE OF PEDIATRIC PATIENTS IN THE EMERGENCY DEPARTMENT

The following are equipment, supplies and medications guidelines for the care of pediatric patients in the Emergency Department (ED). Institutions should ensure that the items are located in areas that are easily accessible to staff depending on the institution's particular configuration and needs.

Pediatric equipment, supplies, trays, and medications should be easily accessible, labeled, and logically organized. Staff should be appropriately educated about the locations of various items, and about the process for obtaining items not in the ED. A list of locations of such items should be in a visible location. Furthermore, each ED should have a method of daily verification of proper location and function of equipment.

In the general ED, essential pediatric equipment should be stored on a mobile, designated "pediatric crash cart" or an equivalent housing apparatus. In the pediatric ED, this may not be necessary.

Pediatric equipment, supplies and medications are presented in three categories of availability, these categories allowed a cost-conscious approach:

- (1) "CC" - On the pediatric crash cart;
- (2) "ED" - In the ED.
- (3) "IA" - Immediately available to the ED. **IA** items may be located in the Nursery, Central Supply, or elsewhere in the hospital. While **IA** items may be life-saving in specific cases (although very rarely used), they are not required for stocking in the ED.

EDs may wish to have certain items more accessible, and some items both in the ED and on the crash cart. The following list is not meant to be completely inclusive but rather to include the most commonly needed items for the general ED.



GENERAL EQUIPMENT NEEDS

Medication chart, tape or other system to assure ready access to proper dosage of medication or proper sizing of resuscitation equipment	CC
Patient warming device	ED
Pediatric crash cart to store all supplies in an organized manner ¹	ED
Scales for measuring weights of infants and children	ED

MONITORING EQUIPMENT

Blood pressure cuffs (neonatal, infant, child)	CC
Blood pressure cuffs (adult-arm and thigh)	ED
Doppler ultrasound devices	ED
ECG monitor or/defibrillator (5-400 J capacity) with pediatric and adult sized paddles	ED
End tidal CO ₂ determination (detector or monitor)	ED
Hypothermia thermometer	ED

¹ In Children's hospitals or hospitals with a separate pediatric emergency treatment area, this recommendation may be met by a crash room.



Intravascular pressure monitoring system	ED
Pulse oximeter	ED
Intracranial pressure monitoring system	IA

RESPIRATORY EQUIPMENT AND SUPPLIES

Endotracheal tubes	
(uncuffed: 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5)	CC
(cuffed: 6.0, 6.5, 7.0, 7.5, 8.0, 9.0)	CC
Feeding tubes (5,8 Fr)	CC
Laryngoscope blades (curved 2,3; straight 0, 1, 2, 3)	CC
Laryngoscope handle	CC
Lubricant (water soluble)	CC
Magill forceps (pediatric and adult)	CC
Nasopharyngeal airways (infant, child and adult)	CC
Oral airways (sizes 0-5)	CC



Stylets for endotracheal tubes (pediatric and adult)	CC
Suction catheters (infant, child and adult)	CC and ED
Tracheostomy tubes (Shiley tube sizes (0-6)	CC
Yankauer suction tips	CC and ED
Aerosol Nebulizer Face Mask	ED
Bag-valve-mask (BVM) device, self-inflating, (pediatric size - 450 ml and adult size - 1000 ml)	ED
Clear oxygen masks (standard and non-rebreathing) for an infant, child and adult	ED
Masks to fit BVM adaptor (neonatal, infant, child and adult sizes)	ED
Nasal cannulae (infant, child and adult)	ED
Nasogastric tubes (infant, child and adult)	ED

VASCULAR ACCESS SUPPLIES AND EQUIPMENT

Arm boards (infant, child and adult sizes)	CC
Butterflies (19-25 gauge)	CC
Catheter over the needle (14-24 gauge)	CC
Intraosseous needles	CC



IV administration sets with calibrated chambers and extension tubing	CC
IV tubing (30 inches)	CC
Stopcocks	CC
Syringes (TB, 3-60 ml)	CC
T-connectors	CC
Umbilical catheters (sizes 3.5 and 5 Fr)	CC
Vascular access supplies utilizing Seldinger technique	CC
Infusion devices with ability to regulate rate and volume of infusate	ED
IV solutions to include: (micro, macro and blood administration)	
Isotonic balanced salt solutions (e.g. NS)	ED
D ₅ 0.2 NS	ED
D ₅ 0.45 NS	ED
Needles (18-27 gauge)	ED
D10 W	IA
IV fluid/blood warmer	IA



FRACTURE MANAGEMENT DEVICES

Cervical immobilization equipment or devices suitable for pediatric patients ²	ED
Spine board (child and adult)	ED

SPECIALIZED PEDIATRIC TRAYS OR KITS

Lumbar puncture tray	ED
Peritoneal lavage tray	ED
Surgical airway tray	ED
Thoracotomy tray	ED
Tube thoracostomy tray	
Chest tubes (infant, child and adult)	ED
Urinary catheterization kit	
Urinary catheters (infant, child and adult)	ED
Vascular cutdown tray	ED
Intracranial pressure monitoring kit	IA

² A cervical immobilization device should be a device that can immobilize the neck of an infant, child or adult in a neutral position. It may be towel rolls, or a commercially available specific neck cradling device.



MEDICATIONS³

Atropine	CC
Bretylium	CC
Calcium chloride	CC
Dextrose	CC
Epinephrine (1:1,000 and 1:10,000)	CC
Lidocaine	CC
Naloxone	CC
Sodium bicarbonate	CC
Activated charcoal	ED
Adenosine	ED
Antibiotics	ED
Antipyretics	ED
Benzodiazepines	ED
Beta Agonist for inhalation	ED
Dexamethasone	ED
Diphenhydramine	ED
Dopamine	ED
Flumazenil	ED
Furosemide	ED
Glucagon	ED
Insulin	ED
Ipecac Syrup	ED
Mannitol	ED
Methylprednisolone	ED

³ The following list of medications represents a minimum inventory of medications to be stocked by emergency departments that care for pediatric patients. This list is not meant to be all inclusive and it is expected that emergency departments will supplement this inventory based on local resources and needs.



Morphine sulfate ⁴	ED
Non-depolarizing neuromuscular blocking agents ⁵	ED
Phenobarbital	ED
Phenytoin	ED
Potassium chloride	ED
Propranolol	ED
Succinylcholine ⁵	ED
Verapamil	ED
Anticonvulsants	IA
Hydralazine	IA
Hydrocortisone	IA
Isoproterenol	IA
Racemic epinephrine for inhalation	IA
3% sodium chloride	IA

⁴ Morphine sulfate or other narcotics (e.g. meperidine) would satisfy this recommendation.

⁵ This recommendation may be satisfied if policies exist that ensure the immediate availability of these medications for emergency intubation of the pediatric patient.

